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SUBJECT: SINGAPORE EYEING NUCLEAR ENERGY FOR THE FUTURE

REF: A) STATE 127423; B) SINGAPORE 1243; C) SINGAPORE 1248

1. (SBU) SUMMARY: Singapore supports the use of nuclear energy for electricity generation, but it currently lacks the land space and technological expertise within its workforce to safely build and operate a nuclear facility. The GOS and other local energy experts view nuclear power as a viable future alternative to Singapore's dependence on natural gas imports and a way to better ensure its long-term energy security. Singapore will likely use foreign direct investment to develop nuclear energy capabilities that it can either export in the near term or use to develop its own nuclear power facilities 20 or 30 years from now when it might be possible to build safer plants with smaller footprints. Singapore has been a member of the International Atomic Energy Agency since 1967 and it is a party to the Treaty on the Non-proliferation of Nuclear Weapons (NPT). End Summary.

2. (SBU) In response to reftel A, post has compiled information about Singapore's nascent nuclear energy industry. Post's responses follow the questions that were included in reftel A.

Overview of Civil Nuclear Power Program

3. (SBU) Describe any plans for the development of nuclear power in your country. Also, describe any existing or planned nuclear power related facilities in your country, such as uranium mining, if any. Do you foresee an expansion of these facilities?

Singapore does not currently have a nuclear power industry. It also lacks natural resources and a domestic mining industry. Singapore does not have the land space to safely house a reactor, but authorities believe it may be an option in 20 or 30 years when technology has improved to build smaller and safer reactors. Singapore Energy Market Authority (EMA) Deputy CEO Lawrence Wong told the DCM that the GOS would like to create the conditions for development of a nuclear power plant so the government is prepared to respond when it is considered feasible from an economic perspective (ref B).

4. (SBU) If your country is considering the pursuit of nuclear power, describe the underlying motivations (e.g., current or anticipated power shortages, energy security, or other industrial uses, such as desalination).

Singapore is almost entirely dependent on natural gas imports for its electricity generation, making it potentially vulnerable to supply disruptions. It also lacks an environment conducive to using other alternative energy sources such as wind or hydro power. The GOS views nuclear as a potentially "clean" option to diversify its energy supplies and enhance its energy security (ref C).

5. (SBU) If there are plans to pursue nuclear power, describe the anticipated government role in the financing of its civil nuclear sector. For example, does the government plan to provide subsidies, tax breaks, loan guarantees, or other financial incentives? Would some or all nuclear power plants be state-owned and operated? Would you seek financing from international investment banks and

organizations or consortium arrangements?

The GOS takes an active role in steering the development of new business sectors to ensure they will be successful and will add higher value jobs to the economy. The Economic Development Board (EDB) promotes foreign direct investment in Singapore, which the GOS has used to develop other energy technologies such as solar, wind and biofuel refining. Even if Singapore does not consume the technologies it develops domestically, it continually looks for opportunities to evolve its economy by bringing in more sophisticated and higher-value technology manufacturing for export. It would likely use the same approach to develop the nuclear energy sector until such a time when it can implement nuclear power domestically. The EMA would continue to regulate the power sector and the National Environment Agency (NEA) would likely be the primary health regulator monitoring risks associated with nuclear energy. There are also several key government-linked companies that dominate Singapore's power sector, such as sovereign wealth fund Temasek and its subsidiaries. It is unclear what their role in nuclear power might be in the future and what kind of incentives they might receive to develop that part of the energy mix.

16. (SBU) What are the names and titles of the key nuclear decision making government bodies and top officials?

The following ministries/agencies and officials are involved in driving Singapore energy policy:

- Ministry of Foreign Affairs (MFA): Paul KOH Kok Hong, Director/Special Duties (Energy). Koh's office in MFA worked with

the Ministry of Trade and Industry to develop Singapore's National Energy Policy, which was released in November 2007. Koh's office also helped create the Energy Studies Institute (ESI), a new energy policy think-tank.

- Energy Market Authority (EMA): Lawrence Wong, Deputy CEO, and David Tan, Deputy Chief Executive, Energy Policy and Planning Division. EMA is the chief energy market regulator. Tan is also active in ESI.

- Ministry of Trade and Industry (MTI): LIM Chee Hwee, Director, MTI's Energy Division. MTI covers a range of economic issues. EMA is a statutory board within MTI, as is A*Star (the Agency for Science, Technology and Research), which could be involved with the R&D side of nuclear technologies.

- Economic Development Board (EDB): Eugene LEONG Jhi Ghin, Head of the Energy division within the Energy, Chemicals and Engineering Services section within EDB.

17. (SBU) Does your country have an existing nuclear regulatory authority? What are its inspection/enforcement powers? If so, how large is it (i.e., how many people does it employ)? If not, are there plans to establish such an authority?

Singapore does not currently have a nuclear regulatory authority with the responsibility of inspecting nuclear facilities. However, the NEA includes the Center for Radiation Protection and Nuclear Science (CRPNS), which acts as the national authority for radiation protection and nuclear safety in Singapore. The CRPNS represents Singapore in the IAEA Convention for Radiation Accidents, Notification and Assistance and the Convention on Nuclear Safety. CRPNS also has responsibility for coordinating GOS planning and response to radiological contamination events in Singapore caused by nuclear accidents in neighboring countries.

18. (SBU) Does your country have a domestic nuclear liability law? If so, please summarize its major elements. In particular, is there a minimum level of required liability coverage required for operation? If your country is not party to an international liability regime, is there any consideration being given to joining one? If so, which international liability regime (Vienna Convention, Paris Convention, Convention on Supplementary Compensation for Nuclear Damage) is being considered.

Singapore does not have a nuclear liability law in place that affects the general public. However, the Radiation Protection Act of 2007 controls the import, export, sale, transport, possession and use of radioactive materials and irradiating apparatus. In accordance with the Act, the CRPNS regulates the disposal of

radioactive waste from hospitals, laboratories, and industrial sites, in line with the specifications of the IAEA TECDOC 855, which pertains to clearance levels for radioactivity in solid materials.

¶9. (SBU) Is the manufacturing base in your country (including high-tech components and heavy industry) involved in nuclear-related products or services? Does it seem likely that any components or contracting services for new plants could be sourced locally, or would the majority of this need to be imported?

Singapore has an advanced, high-tech manufacturing sector, but it does not include nuclear-related products and services. The GOS, through the EDB, will likely encourage investment by foreign firms that offer nuclear-related products or services to develop its own domestic capabilities in this area.

¶10. (SBU) How extensive is your country's nuclear-trained workforce? Does your country have a significant engineering, technician and construction base that could be readily converted into a nuclear workforce (e.g., engineers, high precision manufacturing, robust quality assurance programs, high quality construction)? Will the development of civil nuclear power require a significant foreign workforce? Are programs in place, or being developed, for training of domestic personnel (e.g., in skilled trades and nuclear regulation)?

Singapore does not have a nuclear-trained workforce. However, it does have a highly skilled workforce and advanced manufacturing capability that could be converted to nuclear.

Opportunities for U.S. Industry

¶11. (SBU) Does your country have any current or anticipated nuclear-related tenders? If so, please describe the tender/selection process for new contracts, its timing, and indicate any U.S. firms considering bidding.

Post is not aware of any nuclear-related tenders in Singapore at this time.

¶12. (SBU) What nuclear sector opportunities do you foresee for U.S. industry (e.g., feasibility studies or other consulting services, plant construction management, reactor sales, fuel cycle service provision, plant operations, waste management, or logistics)?

Singapore remains an important financial, trade, and high-tech manufacturing hub with a sophisticated and well-educated workforce. GOS plans to develop a nuclear industry are still in the development phase and not entirely clear, but Singapore would likely welcome discussion of investment from U.S. firms interested in using Singapore as a base for nuclear technology-related product or service offerings in Asia.

¶13. (SBU) If applicable, what are the primary companies (domestic and foreign) involved in (or considering involvement in) your country's civil nuclear sector? Please include utilities, plant operators, fuel cycle service providers, technology vendors, and major construction or consulting firms.

There are no foreign or domestic companies involved in nuclear power generation within Singapore at this time. However, companies such as U.S.-based Thorium Power have visited Singapore to discuss potential opportunities here. Invensys Process Systems, a London-based firm specializing in consulting, software and technologies supporting power and energy companies, has had operations in Singapore for approximately 30 years. According to recent press reports, it is exploring nuclear energy opportunities in Southeast Asia.

Foreign Competitors

¶14. (SBU) Are there other nuclear supplier countries engaging your country? Please describe any available details on formal agreements including existing or potential (1) MOUs on nuclear cooperation; (2) legal frameworks for nuclear commerce; or (3) arrangements for technical or information exchanges.

According to FOO Siang-Tse, MTI Deputy Director for Energy Policy, Singapore does not have any MOUs or agreements on nuclear technology exchanges or other initiatives with other countries at this time.

¶15. (SBU) Are there any political considerations your country may take into account when choosing to cooperate with competing nuclear supplier states?

Singapore is commercially minded and pragmatic. As noted in public remarks by LEE Kuan Yew, Singapore's founding father, Singapore will not rule out nuclear energy as an option, but given its small size and close proximity to countries such as Malaysia and Indonesia, it will have to cooperate with its neighbors to develop safety and security standards before developing its own nuclear power facility.

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